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THE MACRO RESPONSE MONTE CARLO (MRMC) METHOD FOR ELECTRON TRANSPORT

M.M. Svatos, J.A. Rathkopf
Lawrence Livermore National Laboratory, Livermore, CA

Traditionally, electron transport in Monte Carlo codes is accomplished using condensed history methods. These methods use approximations to represent the net result of many individual interactions on an electron's state. It is not practical to perform an analog simulation of every interaction due to their extremely large cross sections. Although condensed history algorithms are reasonably fast, the approximations used can lead to inaccuracies at low energies, high atomic number materials, and medium boundaries.

The Macro Response Monte Carlo method achieves electron transport results that have the accuracy of analog methods at a speed comparable to condensed history methods. The global electron distribution is determined by stepping through the medium with a series of spheres or "kugels". At the end of each step, probability density functions (PDFs) describing the outgoing phase space are sampled from a library which has been pre-computed using a single scatter (analog) code, CREEP. CREEP models all ionization, elastic scattering, and bremsstrahlung events individually by sampling from LLNL databases. A version of CREEP for slab geometries is being released publicly. Benchmarks and results highlighting the accuracy of this code will be shown together with plans for efficient MRMC implementation.

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